

Social Networking in a Disconnected Network – fbDTN: Facebook over DTN*

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ABSTRACT

In this demo, we describe the design and implementation of fbDTN, a gateway that allow users to access Facebook services over a Disruption Tolerant Network (DTN) in a convenient and secure manner. Our system enables users to read their news feed, post status updates and photos, and comment and *like* the posts of other people. We also show the importance of supporting applications like this in a DTN and allow demo session attendees to see this system in action.

Categories and Subject Descriptors

C.2.1 Network Architecture and Design []:

General Terms

Design

Keywords

DTN, social networking, prototype

1. INTRODUCTION

Most work on DTNs has focused on architectures and routing protocols. While this is vital, the communication system in itself is only meaningful if there are applications that real users want to use. It has previously been shown that one of the greatest challenges that DTN researchers face is to find a killer app for their networks and to make sure that users find value in the network. In a deployment of a DTN system with real users, one of the most requested services among younger users was the ability to use social networking services such as Facebook[2, 1].

There has been previous work on building social networking systems specifically designed for opportunistic networks. Such systems have benefits in that they can make use of the local context available through the contacts between mobile nodes. However, most users do not only want to have this social network of only people that are in the same geographic region that make up a particular DTN – they want to be able to access the content of contacts from their full global social network such as Twitter or Facebook.

In this demo, we have designed and implemented *fbDTN*, a *Facebook over DTN* gateway that allows users to access the most important functions of Facebook over a DTN network. This is done using

the Facebook Graph API that provides an interface for third-party applications to retrieve information from and interact with Facebook on behalf of a certain user. This is done in a secure manner as the API does not require the user to divulge her Facebook password to the operator of the gateway. Our system enables users to read their news feed, post status updates and photos, and comment and *like* the posts of other people.

2. SYSTEM DESCRIPTION

The system consists of three main parts: 1) A system for creating user accounts and authorizing our application to access Facebook information on behalf of that user. 2) A gateway residing in the DTN (the *DTN gateway* in the rest of the document). This provides a user interface to the user, sends requests for newsfeed snapshots and processes the responses and sends requests to post status updates, photos, and comments. 3) An Internet connected Facebook gateway (the *Internet gateway* in the rest of the document) that is also connected to the DTN. This processes and authenticates requests coming in from the DTN and handles interactions with the actual Facebook servers. All the DTN nodes in the system run the DTN2 implementation of the Bundle Protocol.

2.1 Authentication and Authorization

The first step in using fbDTN is to set up an account on our system in order to be able to authenticate and authorize the user later on. A user is likely to not want to give her Facebook password to an operator of a gateway like this. This is not necessary as the Facebook Graph API uses the OAuth system for authentication. This allows a user to authorize fbDTN to perform certain required actions (such as reading the user's newsfeed and post items to her wall) on her behalf. After the user has been authenticated and has given this authorization, an OAuth token is issued to fbDTN that stores this in a database in a trusted server. This is the only location the OAuth token is ever stored. This is more secure than for the user to have to give her Facebook password as the OAuth token can be revoked at any time for this specific application. In addition to creating this token, the user is asked to give a new password that will be used to identify the user in the fbDTN system – this is recommended to be a different password than the user's Facebook password. As this entire process requires interaction with Facebook's servers in order to verify the identity of the user and to create the OAuth token, the user account must be created while Internet connectivity is still available.

2.2 Internet Gateway

The Internet gateway runs a daemon that listens for incoming bundles and processes them to see what kind of request it is. It then connects to the MySQL database containing the OAuth tokens and

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retrieves the correct one (given that email address and password match), which is used to perform the action requested by the user. If this action requires a response (such as a request for a newsfeed snapshot), a new bundle is created and sent back to the node (EID) that sent the request.

2.3 DTN Gateway

The DTN gateway runs a daemon that listens for incoming bundles. Currently such bundles will all be containing newsfeed snapshots, but as more functionality is added, there could be other content coming in. The daemon parses the incoming bundles and places the encrypted newsfeed snapshots in their appropriate locations as well as updates the necessary indices that the web interface need to list the available content. The user interface is a web site powered by *php* scripts that allows the user to show the newsfeed snapshots as well as sending off requests over the DTN to the Internet connected gateway.



Figure 1: fbDTN main page.

The main user interface to the Facebook gateway is a web interface, either at a DTN community web server or at the local node. An example of the web interface the user sees when logging in is shown in Figure 1 and the user has the following options, allowing her to access the most important functionality of Facebook:

Post Status Update or Photo

The user is able to post a “status message” to her Facebook profile by entering the new status message on the main page and submitting. Similarly, the user can also choose to upload a photo to her wall, including a descriptive caption. A request is created and sent over the DTN to the Internet gateway that confirms the password, fetches the OAuth token from the database and post the requested item to the user’s profile.

Request Newsfeed Snapshot

The most vital function for most Facebook users is the ability to read the newsfeed that shows recent actions of your friends. fbDTN allows the user to request that a snapshot of the newsfeed is sent to the DTN gateway. A bundle with this request is sent to the Internet gateway which authenticates the user, connects to Facebook and downloads the most recent entries in the user’s newsfeed

(with a timestamp of when the data was fetched from Facebook). The number of entries downloaded at each snapshot is configurable, and if desired, could also be given as an option to the user. This snapshot is encrypted and sent back over the DTN to the requesting user. As the feed snapshot is encrypted, only the correct user will be able to decrypt and read the feed, which is important for privacy.

In addition to requesting newsfeed snapshots manually, fbDTN also gives the option to “subscribe” to newsfeed snapshots. With this option, the Internet gateway will periodically generate newsfeed snapshots and send to the user. Thus, the user can get updated versions of the newsfeed without explicitly having to request it.

View Newsfeed Snapshots

If some newsfeed snapshots have already been requested and delivered, they will be listed at the bottom of the page with the timestamp of when they were retrieved from Facebook. Clicking a newsfeed snapshot decrypts it and shows it to the user. This interface shows the posts available in this snapshot, including who posted them, any comments that have been made to the posts, and a list of who “likes” a certain post. The user is here given the option to post a comment on any of the posts or to “like” a post. If the user wants to do so, the process of publishing that comment or like is similar for that of posting a status update.

3. DEPLOYMENT EXPERIENCE

The fbDTN system was deployed in a real-life DTN test deployment in Swedish Lapponia in 2011. Previous years, the N4C project has allowed the Saami population of this region to send email and access static web content over DTNs. One service that was requested by most of the younger users of that system was the possibility to access Facebook content. In this new deployment (done in collaboration between the SAIL project and the .SE Internet fund), we deployed fbDTN along with the other services. The possibility to access Facebook newsfeeds and post status updates and photos turned out to be the most popular service among local users.

4. CONCLUSIONS AND FUTURE WORK

If DTNs are ever going to have a real impact, it is important to show that applications that are actually useful and desirable for real end-users can be supported. With this Facebook over DTN gateway, we have shown how it is possible to use the public API of such a service to go from something that is highly interactive and dynamic to something that provides most of the desired service, but can still be supported over a DTN.

We plan to extend this gateway by adding more of the functionality offered by Facebook. Among the more important additions that we plan to do soon are the ability to read and send direct messages.

5. REFERENCES

- [1] Networking for communications challenged communities (n4c) project website, <http://www.n4c.eu>.
- [2] A. Lindgren, A. Doria, J. Lindblom, and M. Ek. Networking in the land of northern lights - two years of experiences from dtn system deployments. In *Proceedings of the ACM Wireless Networks and Systems for Developing Regions Workshop (WiNS-DR)*, September 2008.